characteristics as his definition for pure line. "A pure line may be defined as the descendants from one single homozygotic organism exclusively propagating by self-fertilization."[7] It appears that we need badly a term that will include "genotypically identical" series of forms arising in other cases than this one, so that it is difficult to give up the use of the term in this wider meaning.

H. S. Jennings

Mosquito Romance

In the issue of Science for September 15, pp. 350–351, Dr. John B. Smith reviewed a book by Edward H. Ross—"The Reduction of Domestic Mosquitos." While Dr. Smith indicates that the book does not meet the general needs of those to whom the title is obviously meant to appeal, he intimates that it will be valuable "in warm climates." Other reviews of the book have appeared in terms of unqualified praise. The most recent of these is in the November number of *Entomological News*. Furthermore, the book has been well advertised among those who might need useful information on this now important subject. Under the circumstances the writer considers it his duty to protect fellow-workers by indicating the true character of the book.

The author restricts himself to the two principal house-mosquitoes of the tropics, *Stegomyia calopus* and *Culex fatigans*, and the problem of their control. But instead of facts we get an array of well-worn generalities, and, where he deals with the life histories of the insects, of pure fabrications. It would be a waste of valuable space to discuss this book *in extenso;* a few choice blossoms are culled herewith for the benefit of the uninformed.

The book is avowedly economic and biological, but, lest the reader think the systematic side is negligible, we quote the following: "Fabricius in 1805 first designated the 'tiger' mosquito, *Stegomyia fasciata*, although Villiers[1] had probably described the same insect before; Meigen called it *Stegomyia calopus* very soon after. In 1825 Latreille grouped mosquitos generally under the name Culicidæ, but only three genera were known, *Anopheles, Culex* and *Ædes.*" Alas for Meigen and for Theobald!

Chapter II. deals with "the life and habits of mosquitos." One of the first statements we find here is that "the hæmatophagous habit appears to be dependent on the presence, in the female, of the spermatozoa of the male." The author deduces this from the fact that all the females with blood in the stomach dissected by him contained spermatozoa in the spermathecæ. "From this it must be inferred that virgin females do not, commonly, take blood"—surely a simple piece of reasoning! We are then favored with some amusing speculative remarks on this unusual phenomenon. A most remarkable belief of the author is that the female *Culex*, after disposing of her eggs, seeks another male and, after being again fertilized, produces another raft of eggs, and then over again, apparently *ad infinitum*. This absurd belief is, of course, purely a product of the author's imagination and it is controverted by a formidable array of established facts, of which, however, our author is blissfully ignorant. Considerable space is taken up with the reiteration of this notion and the author returns to it again and again. "If a female lays a whole egg-raft or complete brood, she exhausts all the spermatozoa within her spermathecæ and then she must again cohabit with a male in order to be replenished. This is the reason why males are likely to remain in or resort to the places where the females commonly lay their eggs. For example, in houses, the males of the Culecines are commonly found in the water-closets. The females are attracted there by the seal-water,

[7] Johannsen, *Amer. Nat.*, March, 1911, p. 135.

[1] The author's name is de Villers. He described a *Culex fasciatus* in 1789. Independently Meigen, in 1804, and Fabricius, in 1805, described other mosquitoes under the same name. The last of these was the species here considered, but the name is preoccupied by the two earlier homonyms; consequently (*Culex*) *calopus*, the name under which it was later described by Meigen, had to be adopted. The genus *Stegomyia* was established by Theobald in 1901.

for they know that their children will thrive therein; and also that as soon as they have laid their eggs the males are ready to fertilize them again. The eggs exude their larvæ into the seal-water of the closet, the latter are washed down into the cesspool where the water is at an even temperature, and where there is plenty of food for them; so the perpetuation of the species is assured. As the female lives so much longer than the male, her second and third fecundations are brought about by the males of succeeding generations to her own." With modern improvements an up-to-date female mosquito does not even lose time by going down stairs to dispose of her eggs! Further interesting information is that "the larval metamorphosis includes the pupa stage." Most opportune comes the statement: "Both the larva and the pupa are not fish, but insects." *Notonecta* is well known as an enemy of mosquito larvæ and we here learn that "it can hop from one puddle to another. It is a water-beetle, but is rendered powerless against mosquito larvæ when the pond becomes full of green weed, which hampers its movements."

But the acme is reached in Chapter IX., entitled "Mosquito Reduction." This chapter does not, as one would suppose from the title, give useful instruction in the control of mosquitoes. Casting aside the fetters of science, the author soars into the boundless realm of pure imagination. He takes an imaginary female mosquito from the time she emerges from the pupa, through a series of hair-raising adventures, to the end of her life. The story is made fascinating by the author's treatment of mosquito psychology. "The room was almost dark. She settled at once on the mosquito net, waving her hind-legs in an expectant way. The thoughts of a meal made her feel a pleasurable excitement, but she also felt, instinctively, the need for caution." . . . "The wind and disturbance he made with his arms caused the mosquito to fly away to a far corner of the room, and contemplate with quaking thoughts the difficulties of obtaining the necessaries of life." . . . "When on the child's net she noticed that there were a score or so of mosquitoes like herself, with their bodies distended with blood. But there were only two males among them, and they both belonged to an alien species, and they had not fed on the child. What had become of the swarms of males that she had left in the cesspool? She wondered why it was only her sex that required blood. Why had she to risk her life for food while her husband and brothers remained contentedly in their home, the cesspool?" After a series of blood-letting and egg-laying adventures, in which our mosquito shows a considerable capacity for acquiring wisdom, we finally get to the point of the story. The mosquito brigade has been busy, the breeding places have been either oiled, drained or screened.

"Six weeks later she had another brood of eggs to lay. The fountain was now dry. She searched high and low, but there was no water anywhere that was suitable for her eggs; also there were no male mosquitos. All the cesspools contained petroleum, and even the cisterns were screened with wire gauze. So she laid her eggs in some clean water in a basin, but the larvæ died for want of food. She searched for a male mosquito of her species to consort with again; he could not be found. There were no mosquitos at all. Then the craving for blood seemed to forsake her. She became a vegetarian, living on the juices of old banana skins and discarded watermelons. But her life, once so full of adventure, was blasted, and she died disappointed, but with the knowledge that she had lived."

It should be added in closing that several chapters are devoted to directions for making estimates of cost for mosquito-control work, and principally how to wheedle the necessary money out of reluctant authorities, corporations or private individuals.

The appearance of the present work is the more astounding when one compares it with another work which appeared six years ago, as a byproduct of similar activity to Mr. Ross's and in the same locality (the Isthmus of Suez). The work referred to is Dr. Pressat's "Le paludisme et les moustiques" (Paris, Masson et Cie, 1905) which must still be

looked upon as a standard in this class of literature. KONOPS

HOW A FALLING CAT TURNS OVER IN THE AIR

TO THE EDITOR OF SCIENCE: In a lecture on the gyrostat before the Washington Society of Engineers, I gave a valid explanation of how a cat is able to light on his feet when he is dropped back downwards. After the lecture Professor J. F. Hayford was kind enough to call my attention to what is no doubt the actual character of this cat performance, and I give a statement of it herewith for the readers of SCIENCE. However, I prefer the idea I had formerly of the cat performance, because I am able to do it myself, not indeed while falling through the air but while standing on a pivoted stool. It is my impression that the idea I had formerly is the generally accepted idea of the cat performance, but it is difficult to explain, although easy to perform.

The curved figure in the accompanying sketch is a conventionalized cat which is let fall back downwards, and the question is how can a cat (not so highly conventionalized) turn over and light on its feet.

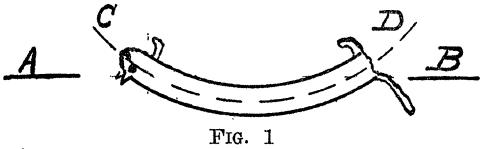


FIG. 1

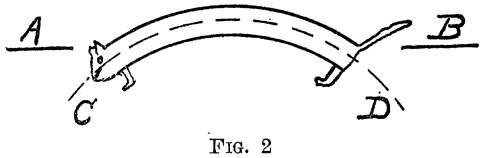


FIG. 2

There are two simple types of motion of the cat's body which give spin momentum around the axis AB, namely, (a) a rotation around AB as an axis of the cat's body as a rigid structure, and (b) a sort of squirming motion in which each part of the cat's body rotates about the curved line CD.

The amount of spin momentum due to a spin velocity a of the first kind is Ka, and the amount of spin momentum due to a squirming velocity b of the second kind is kb; and the factor k[1] is always less than the factor K when the cat's body is curved.

Now suppose the falling cat to exert the muscular action necessary to produce and maintain a squirming velocity b; then the cat's body will simultaneously be set spinning in the first mode at spin velocity a such that

$$Ka + kb = 0$$

or

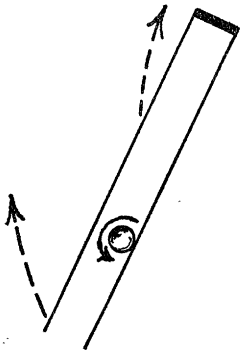
$$b = -(K/k)a,$$

because no spin momentum can be produced by forces inside the cat. Therefore a and b are opposite in sign and b is greater than a. Suppose, for example that b is twice as great as a; then while the cat squirms one complete revolution ($bt = 360°$) his bent form will rotate backwards through half a revolution ($at = 180°$), and the cat will be in the position shown in sketch No. 2, because each part of his body will have rotated through the angle $360° - 180°$ which is $180°$.

W. S. FRANKLIN

HOW TO THROW A CURVED BALL

TO THE EDITOR OF SCIENCE: I have tried a great variety of devices for throwing a curved ball for class-room demonstration, but with only moderate success, and I have tried in vain the method suggested by Professor J. J.



Thomson for causing a rubber balloon to travel in a sharply curved path. A year ago, Professor J. H. Wily suggested a method which is extremely satisfactory, as follows:

[1] This factor is not a moment of inertia in the usual sense of that term; but it is expressible in terms of the same unit.